DOGWOOD LAKE

Daviess County

2005 Fish Management Report

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EXECUTIVE SUMMARY

- Dogwood Lake is a 1,414-acre impoundment located on the Glendale Fish and Wildlife Area. A standard fish community survey was conducted May 16 to 25, 2005 to monitor the fishery at Dogwood Lake. Additional crappie sampling was conducted in March and April 2005 for crappie research. Analysis of historic bass data was also conducted. Standard water chemistry and aquatic vegetation data were also collected.

- The Secchi disk reading was 14 ft and dissolved oxygen was adequate for fish to a depth of 22 ft. Submersed aquatic vegetation was found throughout the lake with a total of 13 species collected. The most abundant plant was coontail which was found at 80% of the sample sites. Eurasian watermilfoil and water stargrass were also abundant.

- A total of 1,697 fish, representing 11 species and one hybrid, was collected. Game species including bluegill, largemouth bass, and redear made up 75% of the fish collected. Growth for game species is consistent with past surveys. Bluegill and redear exhibit average to below average growth up to age 3 and above average growth for older fish.

- Crappie growth was relatively fast. Eighty percent of the crappie collected were greater than 9.0 in TL. Low natural mortality and high exploitation indicate growth-overfishing. A size limit may benefit the crappie fishery by increasing yield (lb) (Hoffman 2006).

- Historically, bass growth has been below the district average. Currently, it takes five seasons to produce a legal size (15 in) bass. Analysis of historic bass data indicated the peak of the bass size structure occurred approximately three to four years after the slot size limit was lifted. Starting in 2003, the number of larger bass and bass growth began to decline.

- The DFW should maintain the biennial stocking of channel catfish at the rate of 3/acre, and continue aquatic vegetation management for the fishery and public access. Results from the 2006 angler creel survey of Dogwood Lake and this data will determine the future management of this fishery.

LIST OF FIGURES

INTRODUCTION

Dogwood Lake is a 1,414-acre impoundment located on the Glendale Fish and Wildlife Area approximately 8 mi south of Montgomery, Indiana. The lake was impounded and opened to fishing in the mid-1960's. Maximum depth of Dogwood Lake is 42 ft while average depth is approximately 10 ft. Public access is available at two state-owned boat ramps; one is located near the Glendale check station and the other is near the dam. Anglers may also fish from designated shoreline areas.

The fish population at Dogwood Lake was renovated in 1978. The lake was restocked with largemouth bass, bluegill, redear, black crappie, channel catfish, and flathead catfish. Channel catfish continue to be stocked biennially at a rate of 3 fish/acre.

A fish survey in 1991 revealed a high density of slow growing bass. Bluegill growth was above average and densities appeared to be lower than in previous surveys. In the spring of 1992, the 14-in minimum size limit for bass was changed to a 12 to 15-in protected slot size limit. Anglers were allowed to harvest bass under and over the 12 to 15-in protected slot size limit.

Annual standard bass sampling and a fish community survey were conducted to monitor the fishery. In 1998, the slot size limit was lifted and replaced with a 15-in minimum size limit. A standard community fish survey in 2000 indicated bass density and bluegill catch rates for all gear types increased from the previous surveys. It was then recommended that the 15-in minimum size limit remain in effect to insure adequate numbers of bass to control panfish. An angler creel survey conducted in 2001 found bass to be the most popular species for Dogwood anglers (Schoenung 2000). Historically, most anglers had targeted panfish at Dogwood Lake.

In July 2002, a fish kill involving only largemouth bass occurred. All bass samples sent for analysis tested positive for Largemouth Bass Virus (LMBV).

To provide angler access and increase predation on bluegill, the aquatic vegetation management consists of aquatic herbicide treatments and the use of a mechanical harvester.

METHODS

A standard fish community survey was conducted May 16 to 18 and 23 to 25, 2005 to monitor the fishery at Dogwood Lake. Effort included 2.25 h night electrofishing, 8 trap net lifts, and 16 gill net lifts (Figure 1). Additional crappie sampling was conducted in March and April 2005 for crappie research.

This report will model historic bass data to gain an understanding of largemouth bass at Dogwood Lake. Bass data collected from spring largemouth bass electrofishing surveys and standard May fish surveys starting in 1991 to the present survey was included in the data set. An age-length key was constructed for each survey year to assign ages from the subsample (DeVries and Frie 1996). Catch-at-age data for bass was combined for the slot size limit time period as well as for the 15-in minimum size limit period. Bass ages 2 to 4 under the 15-in minimum size limit were used to determine natural mortality (Figure 2). This represents a protected portion of the population that should not be affected by harvest. The regression of the ln (number at age) for ages 2 to 4 (catch curve estimate) was created to calculate natural mortality, total mortality and exploitation for bass during and after the different size limit regulations (Robson and Chapman as cited in Van Den Avyle and Hayward 1999).

Dogwood Lake has a history of excessive Eurasian watermilfoil (EWM) growth. Past recommendations have indicated that reducing EWM would improve the fishery by reducing monocultures of EWM and increasing aquatic plant diversity. Fluridone (Sonar) has been applied to five treatment areas on a rotating schedule since 1988. Starting in 2004, a tier II aquatic plant survey was implemented to monitor the results of the program (Figure 3 and 4). A standard aquatic vegetation survey was conducted August 1 to 3, 2005 (Figure 5).

RESULTS

Water quality at the time of sampling was very good. Dissolved oxygen was satisfactory for fish to a depth of 22 ft. The Secchi disk reading was 13 ft 11 in. Dogwood Lake has a history of high water quality in comparison to other southern Indiana lakes.

The excellent water clarity promotes abundant aquatic vegetation growth. The shallow bays on the east end of the lake often have had excessive submersed vegetation.

A total of 203 rake samples was collected and identified in the August 1, 2005 aquatic submersed vegetation survey. There were 12 species of submersed plants and 2 algae species collected. Coontail was the most abundant having a site frequency of 80%, followed by Eurasian watermilfoil (EWM) (51%) and water stargrass (29%). Pondweed family members collected include: American, curlyleaf, Illinois, sago, and small pondweeds. Occurrences of pondweeds were low at less than 3%. There were three species of naiad collected, brittle, bushy, and slender. Occurrences of naiads were also low at less than 5%. Other species collected were American elodea, and the algaes, chara and pithophora.

After the 2004 Sonar treatment, EWM was almost nonexistent in the treatment area (Area 4), scoring a site frequency of 4.5 and a relative density of 0.05. Coontail was abundant at all sample sites and had a high relative density (4.18). Coontail carpeted the bottom and by rake score standards was considered high. Although dense, the plant impaired little of the water column. In other areas of the lake, coontail was matted to the surface. By August 1, 2005, the 2004 treatment area (Area 4) had a EWM site frequency of 95% and a relative density of 1.85. Coontail had a site frequency of 95% with a relative density of 4.75. This treatment did not appear to have "carry-over" control for EWM and there was no increase in plant species diversity.

Area 3 was treated at the same rate in 2005. Treatment Area 3 had a site frequency of 65% in 2004 for EWM. The post treatment survey in 2005 indicated a site frequency of 4.8% for EWM. Coontail had a site frequency of 95% and 100% for years 2004 and 2005, respectively.

A total of 1,697 fish, representing 11 species and one hybrid, was collected. Bluegill was the most abundant species (31%) followed by largemouth bass (25%), redear sunfish (18%), warmouth (9%), black crappie (8%), golden shiner (3%), and yellow perch (2%). Yellow bullhead, channel catfish, hybrid sunfish, grass pickerel, and blackstripe topminnow were also collected at less than 2% each of the total catch.

There were 532 bluegill collected with an estimated weight of 41.36 lb. Length range was 1.2 to 9.4 in TL. Harvestable size (6 in and greater) bluegill accounted for 18% of the sample. Proportional stock density (PSD) (Anderson and Neumann) was 22. Growth, when compared to District 6 average growth in impoundments, was average at

age 1, slightly below average at ages 2 and 3 and average to above average for older fish. This growth trend is similar to the 2001 survey.

A total of 439 largemouth bass was collected with an estimated weight of 195.65 lb. Bass ranged from 3.7 to 20.1 in TL. Legal size (15 in and greater) bass accounted for 2% of the collection. The bass PSD was 31. Age-1 bass growth was above the district average. Growth for older bass was slightly below to below average. Historically, bass growth has been below district average at Dogwood Lake. Currently it takes five seasons to produce a legal bass (15 in).

The 307 redear collected made up 18% of the total catch. Length range was 1.7 to 11.4 in TL. Estimated weight was 90.97 lbs. Redear 6.0 in TL and greater comprised 74% of the catch and 42% were 8.0 in and larger. Redear growth is below average at ages 1 to 3 and slightly above to above average for older fish.

A black crappie mortality research project was conducted starting in 2005 (Hoffman 2006). Black crappies were sampled from mid-March through mid-April using trap nets and daytime electrofishing for this study. A total of 130 black crappie was collected with a length range of 3.7 to 12.1 in TL. Eighty percent of the crappie were 9.0 in and greater. Growth modeling indicated that crappie at Dogwood Lake grow relatively fast. There is low natural mortality and exploitation is high indicating there is growth-overfishing. Crappie are not reaching potential maximum yield and may benefit from a size limit.

There were 35 yellow perch collected that ranged from 5.4 to 12.3 in TL. Eighty percent of the perch collected were 8.0 in and greater. Yellow perch have been present in low numbers since the 1980's. Past surveys have reported similar catches and size ranges.

A total of 159 warmouth was collected with a length range of 3.4 to 8.7 in TL. Sixty-one percent of the warmouth collected were 6.0 in and greater. In 2001, warmouth contributed approximately 1% (709 fish) to the total harvest.

Eight channel catfish were collected with a range of 15.4 to 29.3 in TL. Channel catfish reproduction appears to be low to nonexistent. All fish collected were greater than the average size stocked in 2003.

Other fish collected included 54 golden shiners, 26 yellow bullhead, 4 hybrid sunfish, 2 grass pickerel and a single blackstripe topminnow.

DISCUSSION

As observed in past surveys, water quality at Dogwood Lake is excellent. Water clarity in May was close to 14 ft. In the August vegetation survey, Secchi disk readings were approximately 4 ft. Vegetation management at Dogwood Lake has been a major component in the management of this fishery. Throughout the summer months, shallow portions of the lake harbor excessive stands of vegetation. A mechanical harvester maintains boater access lanes through the east end of the lake and around the boat ramps. The east end of the lake is also the location of three of the five Sonar treatment areas including the 2004 Sonar treatment area. There is concern that the harvester is fragmenting Eurasian watermilfoil and inoculating treatment areas. During the summer months, the water temperature is too warm to safely treat vegetation with herbicides. The harvester has proved to be a valuable tool for maintaining boater access. Future vegetation surveys of treatment areas and limiting harvester activity in certain treatment areas (including the 2005 Area 3) will assist in short and long term success of Sonar applications.

Dogwood Lake continues to provide excellent angling opportunities for bluegill and redear. Largemouth bass play a direct role in the quality of the panfish. High densities of bass, along with angler harvest, continue to maintain the relatively fast growing bluegill and redear populations. The angler harvest is evident when looking at growth of bluegill and redear at ages 4 and above. Bluegill at age 4 ranged from 4.8 to 8.4 in TL. Redear at age 4 ranged in length from 7.2 to 10.5 in TL. In 2001, the average length at harvest was 7.9 in TL for bluegill and 8.4 in TL for redear. This is in the age 4 and above range for both species. Even after the bass slot size limit was replaced with a 15-in limit, the pattern of growth for bluegill remains consistent with pre slot size limit management.

Largemouth bass were managed in the early 1990's with a protected slot size limit. At that time, bass growth was low and densities were high. Conversely, bluegill growth was high and densities were low. In a 1995 evaluation of the slot size limit, Andrews documented increased bass growth at age 4 and 5 by 1.0 and 1.5 in TL respectively. However, growth at that age was still below district averages. Growth in 2005 is slightly lower than previous samples but is still higher than growth during the slot size limit (Figure 6). PSD for bass is 31, which is slightly lower than in 2004 (Figure 7).

Over the past 7 years, Dogwood Lake bass, on average, have reached 15 in TL in 5.3 years. During the 15-in minimum size limit period, total annual bass mortality for ages 2 to 8 was 46% (±1.0%). Based on catch curve data, natural mortality was estimated to be 14%. Subtracting natural mortality from total mortality gives an exploitation rate of 31%. Total annual mortality during the slot size limit was 57% (±2.0%). Natural mortality was consistent with the 15-in minimum size limit giving an exploitation rate of 43% during the slot size limit period. During the slot size limit time period bass reached 15 in TL in 6.2 years.

Slot size limits are only effective if there is angler participation/harvest. At Dogwood Lake, total annual mortality during the slot size limit was higher than the 15-in minimum size limit period indicating angler participation. Size structure peaked, in relation to RSD-14, for bass in 2001, suggesting that the effects of the slot size limit carried over for approximately three to four years before growth started to decline.

In the 2001 creel survey, an estimated 1,362 bass (0.94 bass per acre) were harvested. An estimated 124,910 bass were caught and released. The harvest rate appears low in relation to exploitation. Given the high level of catch and release for bass, delayed hooking mortality may also explain the high estimate for exploitation.

The 2002 LMBV fish kill occurred when bass size structure was near its peak for the 14 year time period. Results of a 2003 study of five Alabama reservoirs that had confirmed cases of LMBV indicated bass between 10 and 16 in TL were most susceptible to the virus (Maceina and Grizzle 2006). At these reservoirs there was also reduction in relative weight, slowed growth, and a reduction in memorable size fish. This condition persisted at these reservoirs years after the initial fish kill. Although not definitively confirmed, there appears to be a link to the virus phenomenon. The Dogwood bass population appears to be reacting in a similar manner. One lake in the Alabama study did exhibit signs of recovery approximately five years later. All fish samples from this lake tested negative for the virus, growth increased, and angler and electrofishing catch rates increased for larger sized fish.

Currently Dogwood Lake is one of the top panfishing lakes in the southern part of Indiana, if not the whole state. Size structure for bass at a PSD of 31 and an RSD-P of 3 fall within the range for panfish management. Sustaining this fishery will be a top priority when considering when or if new bass regulations are proposed.

Future spring samples of bass at Dogwood Lake will monitor the fishery. An angler creel survey will be conducted in 2006. Angler harvest, catch and release and satisfaction data concerning the fishery will also be used to determine future management of Dogwood Lake.

RECOMMENDATIONS

- Continue to evaluate the use of early season Sonar applications as a means of Eurasian watermilfoil control.
- Evaluate largemouth bass and their role in the fishery at Dogwood Lake.
- If funds are available, collect and send Dogwood Lake bass for laboratory testing for LMBV.

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Approved by: _____
Brian M. Schoenung, Fisheries Supervisor
Date: December 1, 2006

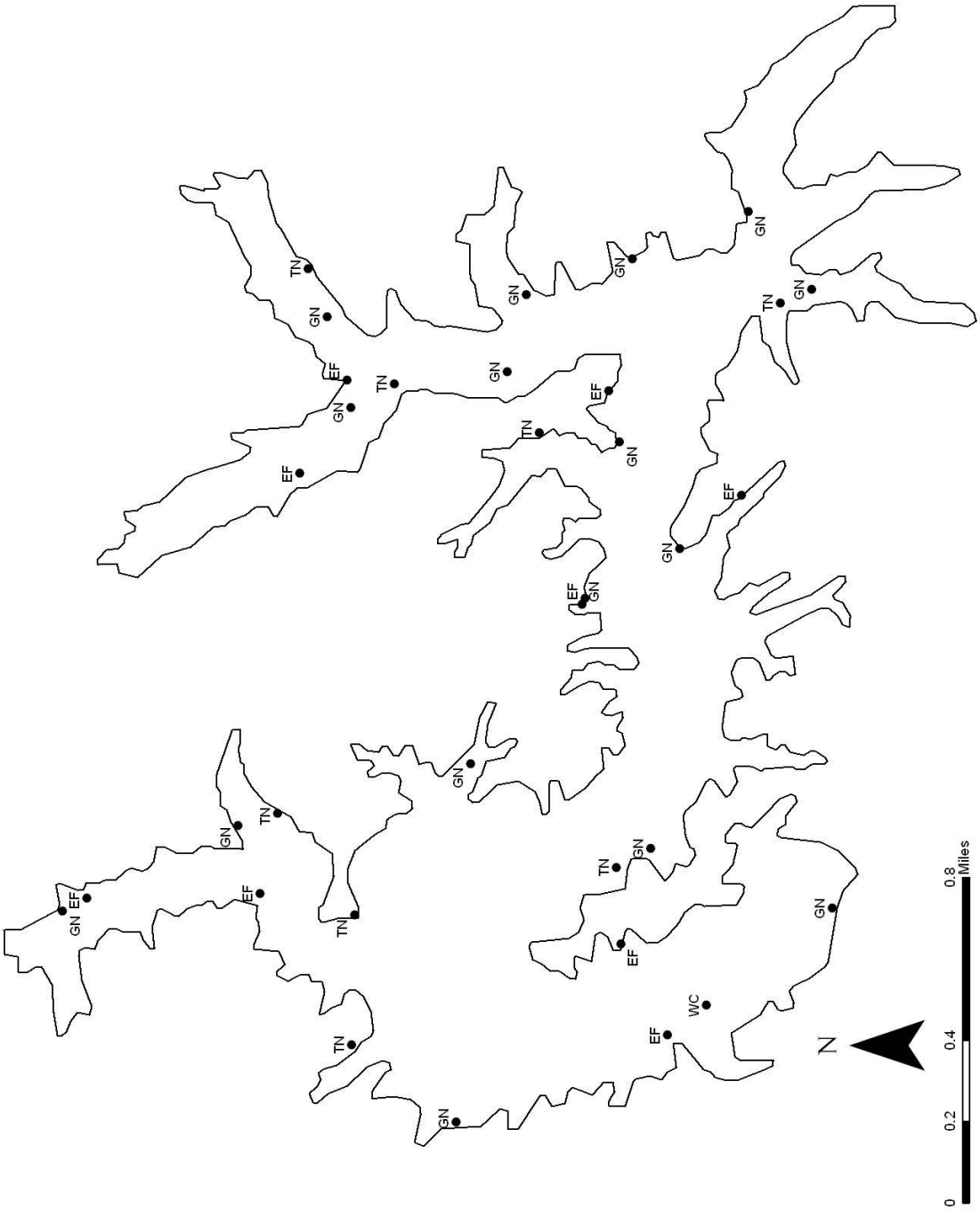

Figure 1. Dogwood Lake fish sampling locations by gear type, May16 to 18 and May 23 to 25, 2005.

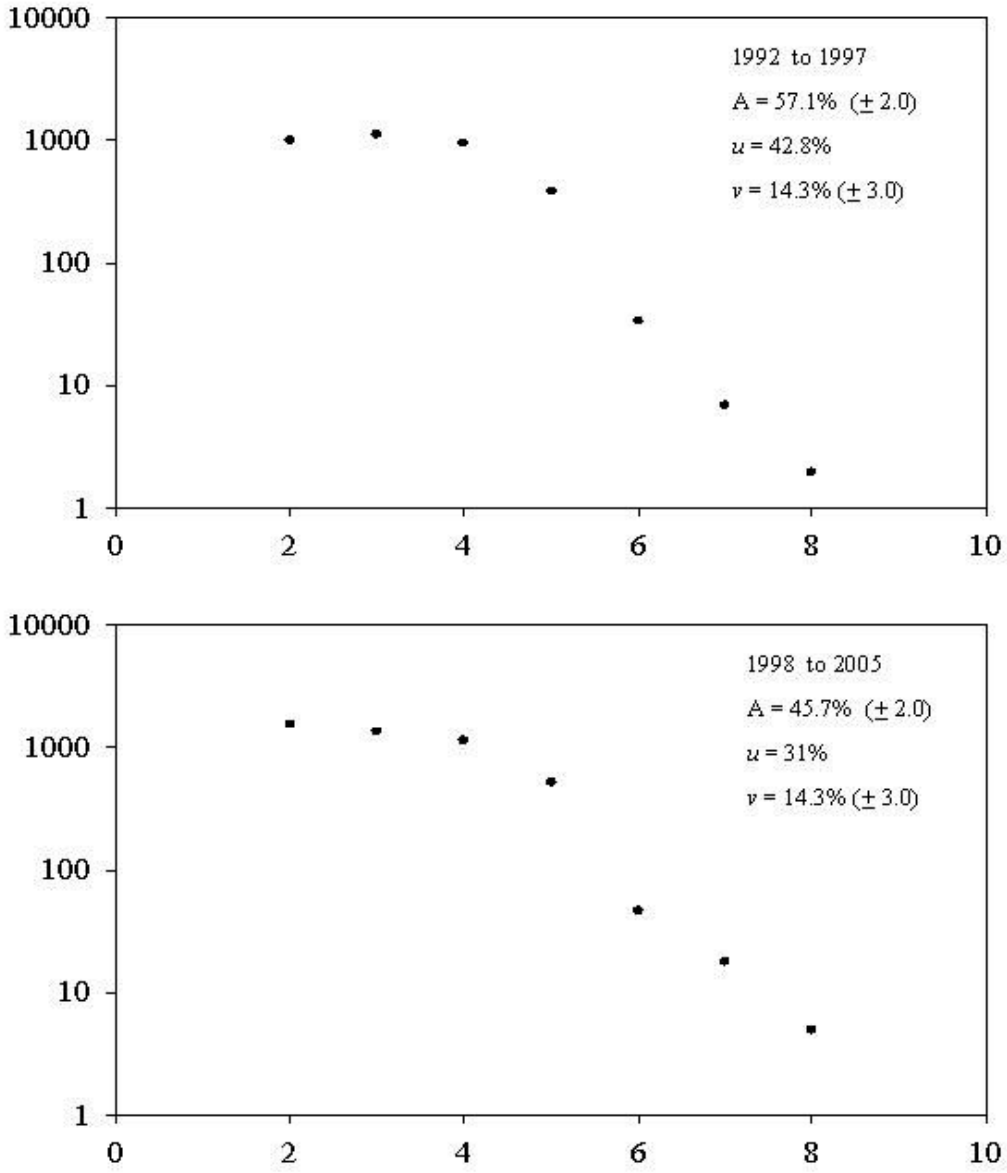

Figure 2. Catch curves for Dogwood Lake largemouth bass during the slot size limit and for the 15-in minimum size limit.

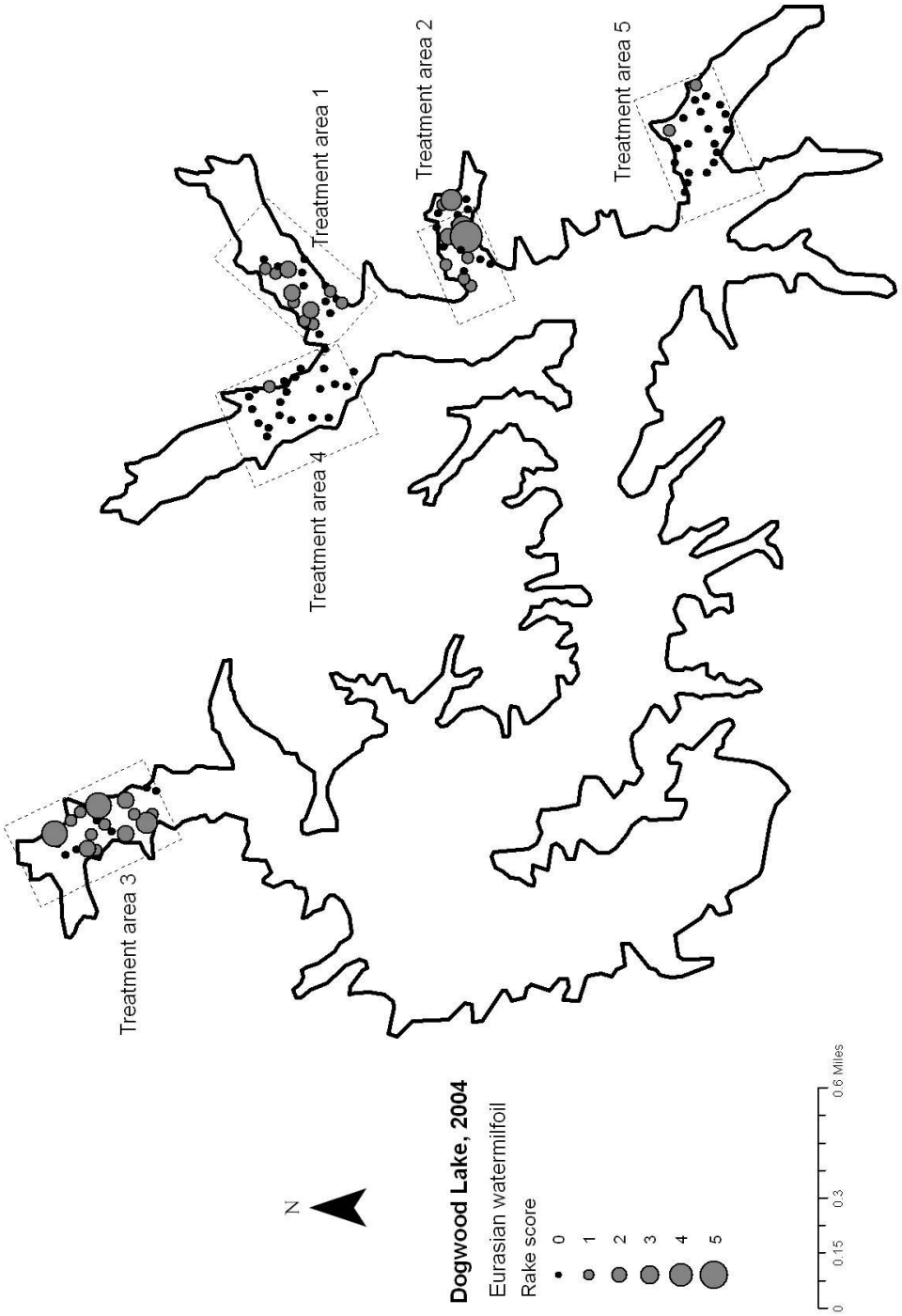

Figure 3. Dogwood Lake vegetation sample points and rake scores for Sonar treatment areas, 2004.

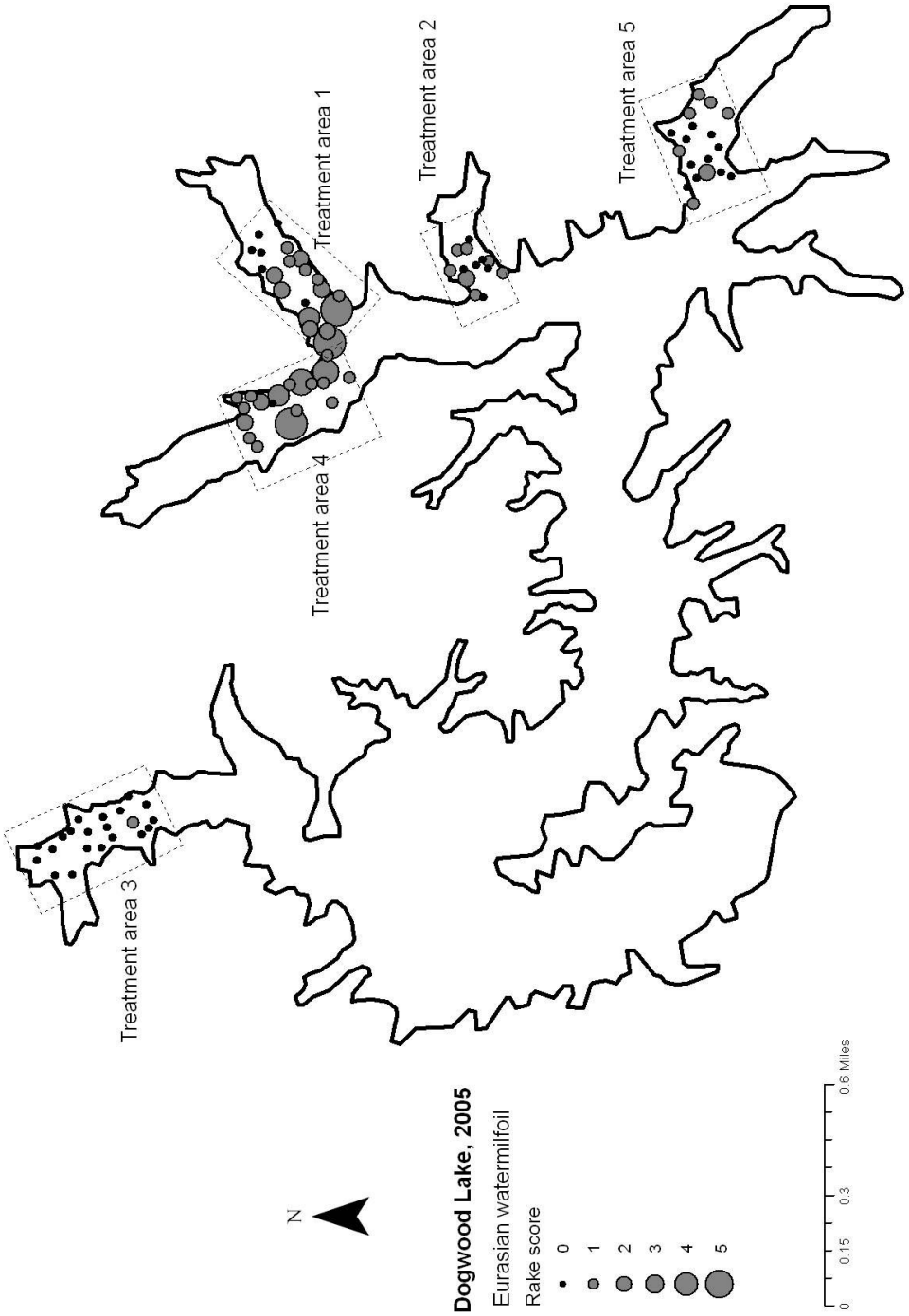

Figure 4. Dogwood Lake vegetation sample points and rake scores for Sonar treatment areas, 2005.

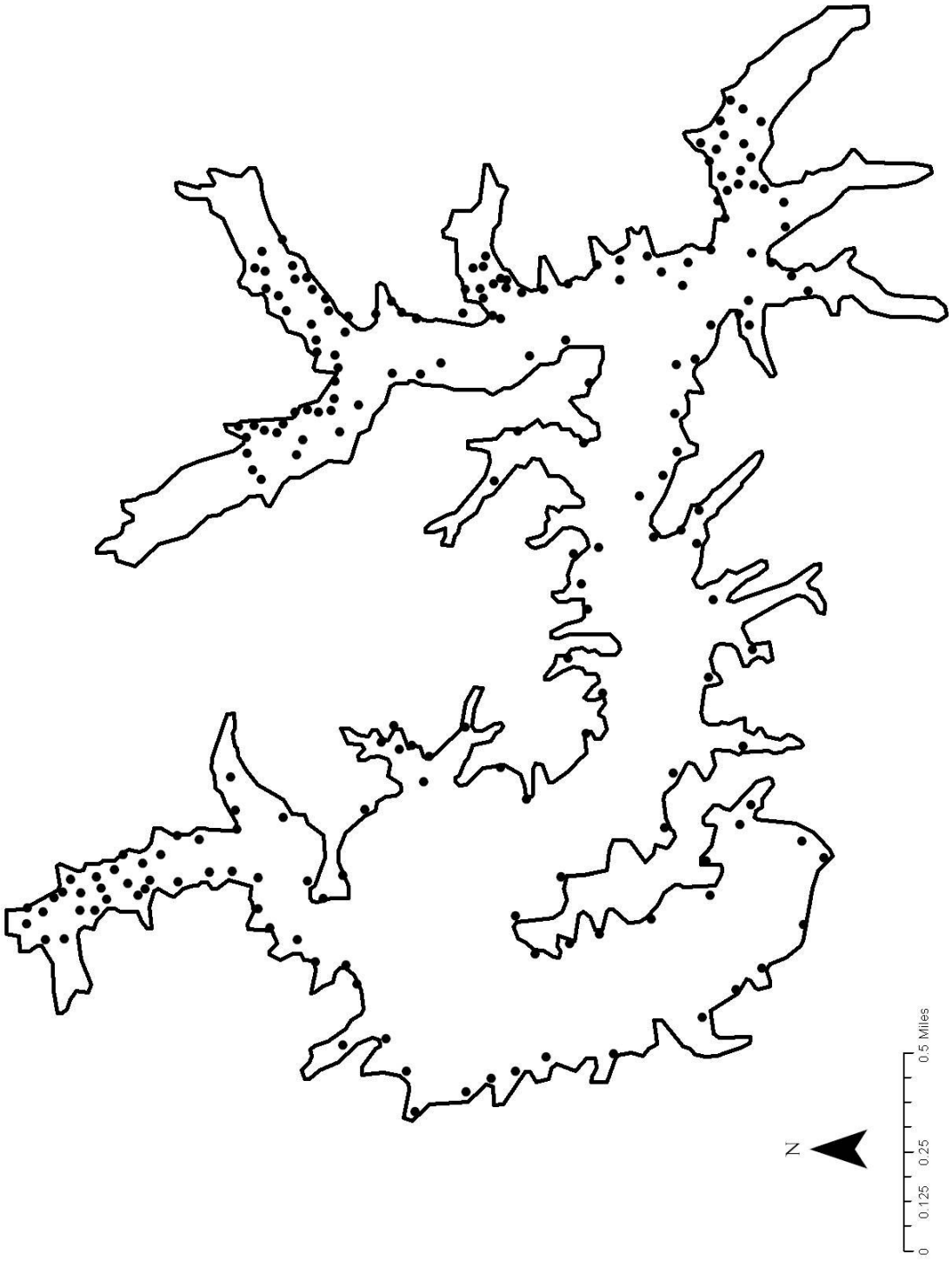

Figure 5. Dogwood Lake standard vegetation survey sample points, 2005.

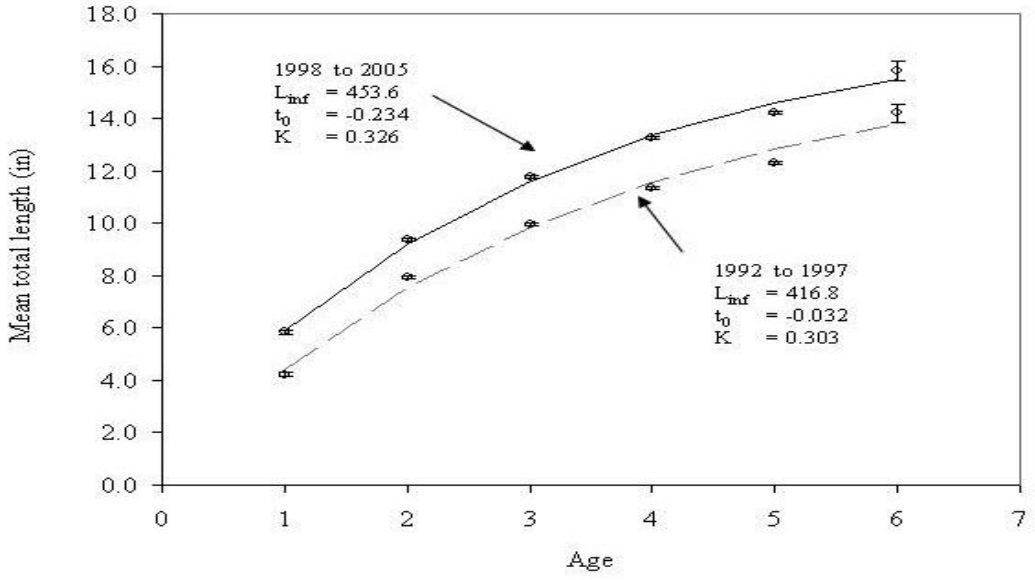

Figure 6. Growth for largemouth bass at Dogwood Lake during the slot size limit (1992 to 1997) and growth under the 15-in minimum size limit (1998 to 2005).

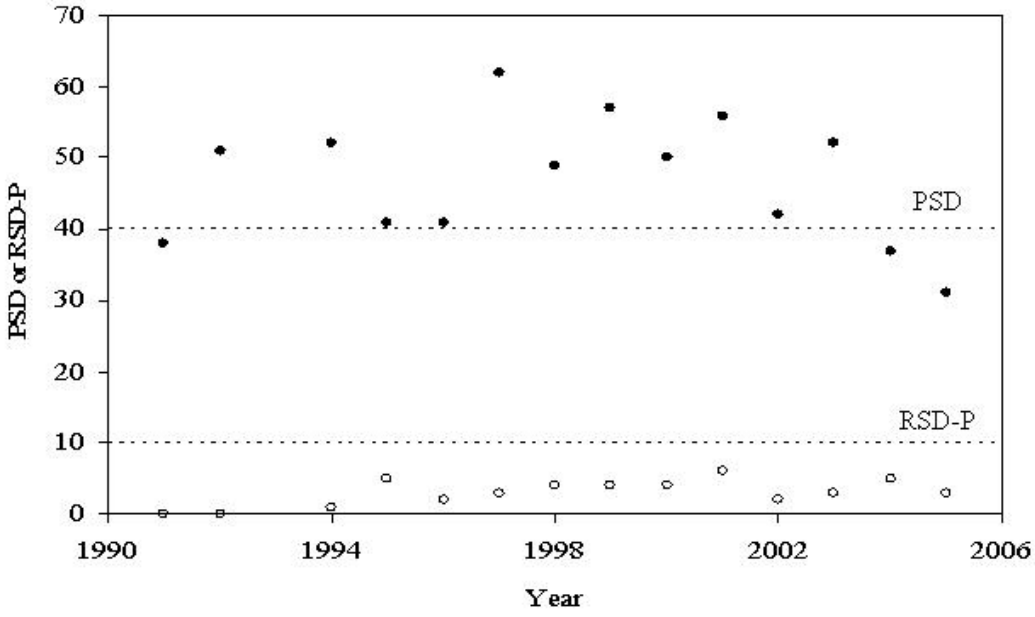

Figure 7. PSD and RSD-P for largemouth bass at Dogwood Lake from 1991 to 2005.